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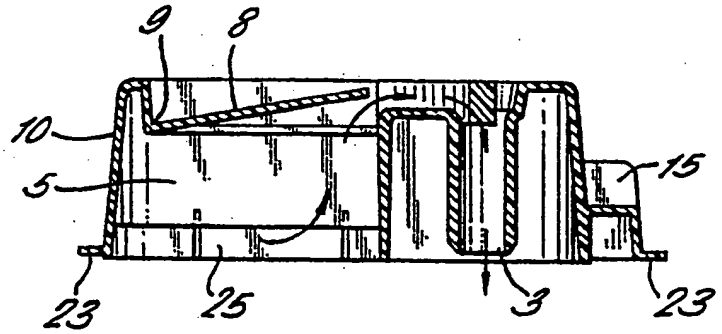
(54) Packages containing comestibles.

(57) A sealed package containing one or more powder, paste or liquid comestible preparation ingredients and being formed from substantially air- and water-impermeable materials, the said package comprising a compartment containing the said one or more comestible preparation ingredients, an inlet which communicates with the said compartment and an outlet which communicates with the said compartment the package being provided with control means to prevent the ingress of the powder, paste or liquid ingredient or ingredients into the outlet from the compartment containing the ingredients prior to the preparation of a comestible from the said ingredients.

FIG. 1D.



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The present invention relates to packages containing comestibles and, in particular, to sealed packages which are formed from a substantially air- and water-impermeable material and which contain comestibles, preferably one or more ingredients for the preparation of beverages.

It has previously been proposed to seal beverage preparation ingredients in individual air-impermeable packages. For example, cartridges or capsules containing compacted ground coffee are known for use in certain coffee making machines which are generally termed "espresso" machines. In the production of coffee using these coffee machines the coffee cartridge is placed in a brewing chamber and hot water is generally caused to pass under pressure through the cartridge, thereby extracting the aromatic coffee constituents from the ground coffee and producing a coffee beverage.

Cartridges containing roast and ground coffee in which hot water flows under gravimetric force through the cartridge are also known. A cartridge of this general type is described in British Patent No. 1397116.

In our European Patent Application No. 87311325.2 there is described a package which contains at least one beverage preparation ingredient, e.g. roast and ground coffee. In a preferred embodiment the package is formed from a substantially air- and water-impermeable material and comprises a sealed body portion having a compartment containing the beverage ingredient and an outlet channel, the compartment and the outlet channel co-operating in such a manner that, in use, the beverage is filtered, thereby avoiding the necessity for an external filter.

There is also described in European Patent Application No. 87311325.2, a method for preparing a beverage which comprises positioning a beverage containing package at a brewing station, introducing water through water introduction means into the package, allowing the water to commingle with the beverage ingredient, and collecting the beverage so-formed through an outlet formed in the package.

The beverage packages as described in European Patent Application No. 87311325.2 are primarily intended to be used with a beverage preparation machine which handles the packages automatically or semi-automatically. A machine of this type is described in our European Patent Application No. 89302708.6. The packages may contain roast and ground coffee, leaf tea or one or more powder, paste or liquid beverage preparation ingredients such as powdered chocolate, powdered coffee or powdered soup. The beverage preparation ingredients are thus usually soluble and dissolve in the water introduced into the package thereby to form the beverage. However, problems may be encountered when the packages contain one or more powder, paste or liquid beverage preparation ingredients because the beverage preparation ingredient or ingredients may migrate through the capsule or cartridge to the outlet nozzle. When the outlet for the beverage is formed in the package the beverage preparation ingredient or ingredients will then contaminate the cup which the beverage is to be dispensed, which is unsightly and not liked by the consumer, and/or contaminate the cutting or piercing tool used to form an outlet in the package during the beverage preparation cycle.

Packages which contain comestibles other than beverage preparation ingredients, for example mustard powder or paste, and powders or pastes for the preparation of sweet or savoury sauces are also known.

We have now developed a modified package containing one or more powder, paste or liquid comestible preparation ingredients which prevents the migration of the ingredient(s) into the outlet nozzle of the package.

Accordingly, the present invention provides a sealed package containing one or more powder, paste or liquid comestible preparation ingredients and being formed from substantially air- and water-impermeable materials, the said package comprising a compartment containing the said one or more comestible preparation ingredients, an inlet which communicates with the said compartment and an outlet which communicates with the said compartment the package being provided with control means to prevent the ingress of the powder, paste or liquid ingredient or ingredients into the outlet from the compartment containing the ingredients prior to the preparation of a comestible from the said ingredients.

The packages of the present invention are preferably packages which contain one or more powder, paste or liquid beverage preparation ingredients and the invention will be more fully described hereinbelow with reference to such packages.

The beverage package of the present invention preferably has a body portion which may be formed, for example, from a moulded plastics material. The inlet and/or outlet of the package may be closed by a plug of a plastics material moulded into the inlet and/or outlet during the moulding of the body portion. Alternatively, the inlet and/or outlet may be covered by a substantially air- and water-impermeable material, for example aluminium foil or a laminated material, such as a laminate of plastic material/metal foil/plastic material, prior to the opening of the inlet and/or outlet. Specific examples of materials which can be used are aluminium foil having a thickness in the range of from 30 to 60 micrometres coated with a layer of polypropylene or a laminate of polypropylene/aluminium foil/polyester.

The outlet in the package may be prepared during the beverage preparation cycle using a cutting and piercing tool for example of the type as described in our European Patent Application No. 89302708.6.

Alternatively, the inlet and/or outlet may be open

and the beverage package provided with an outer wrapping or the like. For example, a plurality of packages may be provided with a shrink wrapped outer layer.

The control means incorporated into the beverage packages of the present invention is generally positioned between the compartment containing the beverage preparation ingredient(s) and the outlet in order to prevent the entry of the beverage preparation ingredient(s) into the outlet before the beverage is prepared. The control means may be of various different designs and some examples of different control means are described below. It will be appreciated that whilst some control means can be used to prevent powders, pastes and/or liquids from migrating to the outlet, other control means are suitable only for preventing the ingress of powdered ingredients into the outlet.

A first type of control means comprises a flap positioned between the compartment and the outlet, the flap remaining closed under the weight of the ingredient(s), but deforming, in use, under the pressure of the beverage formed from the ingredient(s) thereby allowing the beverage to flow therethrough.

A second type of control means comprises a slit of a deformable material, such as a plastics material, metal foil or laminate, positioned between the compartment and the outlet, the slit in the material not allowing the ingredient(s) to pass through it but deforming in use, under the pressure of the beverage formed from the ingredient(s), to allow the beverage to flow therethrough.

A third type of control means comprises a seal positioned between the compartment and the outlet, the seal being held in position by an adhesive which is susceptible to mechanical peel and/or elevated temperature so that it is ruptured by the pressure and/or temperature of the beverage formed from the beverage preparation ingredient(s).

A fourth type of control means comprises a soluble plug or membrane of a water soluble harmless substance positioned between the compartment and the outlet, the plug or membrane dissolving when the beverage prepared from the beverage preparation ingredient(s) comes into contact therewith.

A fifth type of control means comprises a mechanical plug positioned within the outlet the mechanical plug being adapted to move from a position in which it closes the outlet to a position in which the outlet is opened. The mechanical plug may be moved from its closed to its open position by a piercing tool of the type as described in our European Patent Application No. 89302708.6.

The packages of the present invention are preferably provided with a recognition means whereby, in use, the package is identified by the machine into which it is placed for treatment and the identification of the package thereby causes it to be subjected to the correct treatment steps including the introduction of a fluid medium into the package. For the preparation of beverages from powdered beverage preparation ingredients the fluid medium introduced into the package will be water, or a water/air mixture.

The recognition means may comprise one or more surface features formed in the body of the beverage package. For example, the package body may be provided with one or more indents, cut outs, protrusions or holes which can be identified by a mechanical sensor in the beverage preparation machine, the mechanical sensor registering the presence or absence of the indents, cut outs, protrusions or holes.

The recognition means may, alternatively, comprise a system which can be sensed by a simple optical device, for example a bar code printed onto the body of the package, a pattern of through holes in the package, a pattern of contrasting tones or colours printed onto the package or packages containing different comestibles being of different colours.

The recognition means may also comprise one or more strips of a magnetic material applied to the body of the package which can be read by an appropriate magnetic sensor; one or more shaped or divided areas of metal foil applied to the package body which cause an inductive effect on movement of the package in the machine, which inductive effect can be sensed; or one or more electrically conductive areas formed on the body of the package which can be sensed electrically.

As mentioned above, the package of the present invention contains powder, paste or liquid comestible preparation ingredients, preferably one or more powdered beverage preparation ingredients, for example, powdered chocolate, powdered soup, powdered coffee, and sugar and/or creamer, as desired. One machine which can readily be adapted for the preparation of a beverage from the preferred beverage package of the invention which includes a recognition means is described in our European Patent Application No. 89302708.6. The only modification required to be made to such a beverage preparation machine is to incorporate an appropriate sensor or sensors into it, the sensor or sensors being designed to read the particular coding on the capsule and to send a signal to the controller, which then selects the appropriate beverage preparation cycle.

The recognition system used on the beverage packages of the present invention enables a single beverage preparation machine to prepare from different beverage packages a great number of different beverages which require different beverage preparation conditions.

The packages of the present invention may be treated by a machine which includes therein one or more sensors which are adapted to sense and identify a recognition means provided on a package inserted into the machine.

The sensor may be, for example, a mechanical sensor, an optical sensor, a magnetic sensor, an electrical sensor or an inductive sensor. The machine is preferably adapted so that the package is handled automatically following its insertion into the machine. For example, a machine of the type as described in our European Patent Application No. 89302708.6 can be fitted with an appropriate sensor to sense and identify a recognition means provided on beverage packages intended for use therewith.

The present invention will be further described with reference to the accompanying drawings, in which:-

Figure 1A is a perspective view of part of a beverage package of the invention;

Figure 1B is a top plan view of the beverage package of Figure 1A;

Figure 1C is a section through the beverage package of Figure 1A along line A-A with the control means in operation;

Figure 1D is a section through the beverage package of Figure 1A along line A-A with the control means displaced by the flow of beverage;

Figure 2 is a schematic view of a second embodiment of the invention showing an alternative control means;

Figure 3 is a schematic view of a third embodiment of the invention showing an alternative control means;

Figure 4 is a schematic view of a fourth embodiment of the invention showing an alternative control means;

Figure 5A is a schematic view of a control means comprising a mechanical plug in its closed position; and

Figure 5B is a schematic view of the mechanical plug shown in Figure 5A in its open position.

Referring to Figures 1A and 1B, a beverage package body is shown at 1. The body may be formed, for example, from a moulded plastics material. The body 1 has a compartment 2 in which the powdered beverage preparation ingredient or ingredients are contained. The package body has an outlet nozzle 3 formed therein. The compartment 2 is separated from the area of the body in which the nozzle 3 is formed by means of an upstanding wall 4. An extension 5 of wall 4 separates the compartment 2 from a chamber 7 which is positioned between the said compartment 2 and the outlet nozzle 3. As best shown in Figure 1B, the flap 8 covers the chamber 7 and thereby prevents any powder which migrates from compartment 2 entering outlet nozzle 3. The flap 8 is joined along edge 9 thereof to a turned over portion of outside wall 10 of the container. The other three edges of the flap are in close proximity to the other walls of the chamber 7, but are not attached thereto. The flap 8 is constructed from a thin plastics material which is substantial enough to resist the weight of the powdered ingredient(s) before the capsule is used. The flap 8 may be attached by flap edge 9 to the turned over portion of wall 10 either by moulding a fine gap around the flap, or by shearing the flap on three sides as a postmoulding operation.

In use of the beverage package as shown in Figures 1A and 1B the bottom of the package is sealed by means of an aluminium foil or a laminated foil which is heat sealed to the lower edges of walls 4 and 10 and to the lower outer edge 23 of the package 1. Water enters the package at a pressure of about 10^5Pa via inlet 12 which is opened by piercing or cutting the material covering the said opening. The water enters a channel 11 surrounding two sides of the compartment 2 containing the beverage ingredients. The water, which is under pressure, is forced through the elongate slots 13 formed in the wall 14 which separates channel 11 from compartment 2. The slots 13 as shown in Figure 1 are each approximately 0.5 mm wide and 3.5 mm long. The slots 13 act to impede the flow of water under pressure through them and give rise to turbulent flow of the water into the compartment 2. The turbulent flow effects a mixing and dissolution of the beverage preparation ingredients. The beverage so-formed, or the mixture of beverage ingredient(s) and water, then passes through a slit 25, formed between the bottom of wall 5 and the aluminium foil or laminated foil sealing the bottom of the package, into chamber 7. The pressure of the beverage, or the mixture of beverage ingredient(s) and water, causes the flap 8 to be displaced by the flow thereof and the beverage or mixture then flows into outlet nozzle 3. The beverage or mixture is then collected in a cup or other receptacle placed below the outlet nozzle 3.

Referring to Figures 1C and 1D, flap 8 is shown in its closed position in Figure 1C, hinged at 9 to a downturned portion of wall 10. In Figure 1D, flap 8 is opened by the flow of beverage under wall 5 via slit 25 in the direction indicated into compartment 7. The pressure of the beverage in compartment 7 causes the flap 8 to open and the beverage then flows in the direction indicated by the arrows into outlet nozzle 3. The beverage is then collected in a cup or other receptacle placed below the outlet nozzle 3.

Although in the embodiment as shown in Figures 1A to 1D the flap 8 has been shown extending in a substantially horizontal direction before it is displaced by the beverage, it may be preferable for the flap 8 to extend downwardly at a slight angle to the horizontal. The flap 8 thus bears firmly against wall 4 and will not be readily displaced during transit or storage of the package, thereby preventing accidental opening or partial opening of the flap. During the preparation of the beverage, the pressure of the beverage in compartment 7 is sufficient to cause flap 8 to flex and thereby to open.

The beverage package as illustrated in Figures

1A to 1D incorporates the recognition means which is a preferred feature of the invention. The package of the invention 1 containing one or more beverage preparation ingredients has a generally rectangular shape with flat top and bottom surfaces and is thereby suitable for insertion into a beverage preparation machine, for example of the type as described in our European Patent Application No. 89302708.6, longitudinally through a slot.

The package is also provided, as best shown in Figure 1B, with teeth 15 moulded along one side wall of compartment 2. The teeth 15 have recesses 16 formed therebetween. These teeth 15 are intended to enable the beverage package to be driven through a beverage preparation machine by the engagement of the teeth 15 with the tooth of a cam (not shown). The side wall 17 of the beverage package has an elongate recess 18 formed therein near to the leading end 19 of the package.

As the package is driven into the beverage preparation machine the elongate recess 18 is sensed as the side edge of the package passes beneath a sensing arm (not shown). The elongate recess has a plurality of upstanding pegs 20,21,22 located therein and as the package is driven into the machine by the engagement of the teeth 15 with the tooth of a cam, the sensor senses the presence or absence of upstanding pegs 20,21,22.

If one or more of pegs 20,21,22 is not present the sensing arm will thereby identify a different type of beverage package. The sensing arm operates a microswitch (not shown) which thereby transmits information concerning the presence or absence of the pegs on the package to the control mechanism for the beverage dispensing machine. The arrangement of pegs 20,21,22 on the package thus identifies the type of package to the controller which then selects the appropriate beverage preparation conditions.

The presence or absence of the pegs 20,21,22 provides scope for the sensing arm to sense up to 8 different types of beverage packages. Thus, if the presence of a peg at a particular location is coded as 1 and the absence of a peg coded as 0, the following code combinations can be achieved.

000
001
010
100
101
110
011
111

It will be understood that the presence of one or more further pegs at the top of package wall 17 would provide an even larger number of code combinations.

When the beverage preparation machine has selected the appropriate beverage preparation conditions, the water inlet 12 of the package is pierced or cut, an outlet 3 formed in the package and water caused to flow under pressure through the compartment containing the beverage ingredient(s). The chosen beverage then being collected in a cup or receptacle placed below the outlet 3 of the package.

It will be appreciated that for different types of packages the beverage or other ingredient may require significantly different treatment. Thus, some beverages will be prepared with hot water and some with cold water, whilst others, such as espresso coffee, will require a smaller amount of water for their preparation. Preparation times may require to be varied. Similarly water and/or air may be required either for preparing/dispensing the beverage/content of the package or for the purpose of pre-cleaning an inlet pipe or flushing out a used package. Furthermore, a user may require a particular beverage to be dispensed in combination with one or more ingredients from independent sources, e.g. powdered milk and/or sugar.

Figure 2 shows an alternative embodiment of the invention. In this embodiment a plastic film or foil laminate 31 is welded to a shoulder 32 formed in the walls of chamber 7 and surrounding the said chamber 7. The plastic film or foil laminate 31 has a slit 33 formed therein. Any powder migrating from chamber 2 through slit 25 cannot pass under its own weight through the slit 33, because the slit 33 will not open. However, when a beverage is prepared from the powdered ingredient(s) contained in chamber 2 the flow of the pressurized liquid or liquid/powder mixture through chamber 7 forces the slit 33 to open and the beverage then flows to outlet nozzle 3 and thence to a cup or receptacle positioned below outlet nozzle 3 for collection.

A still further embodiment of the invention is shown in Figure 3. This arrangement is similar to the arrangement shown in Figure 2. A seal 34, for example of a plastics film material, is bonded around its edges to the continuous shoulder 32 surrounding chamber 7 by means of a low tack adhesive. The low tack adhesive may be susceptible either to mechanical peel when a beverage formed from the beverage preparation ingredient(s) contained in chamber 2 passes via slit 25 to chamber 7, or by the action of the elevated temperature of the beverage, or a combination of both of these mechanisms. The seal thus ruptures and the beverage flows through outlet nozzle 3 to a cup or other receptacle positioned below outlet nozzle 3.

A still further embodiment of the invention is shown schematically in Figure 4 where a plug 35 of a

soluble material covers the outlet nozzle. The beverage prepared from the beverage ingredient(s) in compartment 2 passes through slit 25 and into chamber 7. The beverage then contacts the soluble plug 35 and causes the plug to dissolve, thus uncovering the outlet nozzle through which the beverage then flows into a cup or other receptacle. The soluble plug 35 should, of course, be prepared from a harmless material, or from a material which is to be incorporated into the beverage. For example, the plug could be prepared from sugar for the preparation of sweetened beverages.

An alternative embodiment of the invention is shown schematically in Figures 5A and 5B. Referring to these Figures the body of a beverage package is shown generally at 40. The compartment containing the beverage ingredient or ingredients is shown at 41. The package has an outlet nozzle 42 formed therein which is surrounded by a counterbore 43. The outlet nozzle is prevented from communicating with the remainder of the body of the package by means of a seal 44 which is moulded into the plastics material from which the body portion of the package is formed. The seal is surrounded by a line of weakness 45. The outlet and the base of the package are closed by an air- and water-impermeable material 46, for example a metal foil. The outlet nozzle 42 is sealed, as mentioned above, by rupturable seal 44 and a mechanical plug 47 lies within the outlet nozzle. The plug 42 is provided with wings 48 which sit within a groove (not shown) formed in outlet nozzle 42.

In use of the package in a beverage preparation machine a platen 49 containing a piercing and folding mechanism 50 is positioned below the package. The piercing and folding mechanism is moved in an upwards direction by the beverage dispensing machine and causes the air- and water-impermeable material 46 to be cut. The mechanism 50 also folds the cut material back into the counterbore 43. The piercing and folding mechanism thus moves in an upwardly direction and the unserrated edge 51 of this mechanism co-operates with wings 48 formed on mechanical plug 47, thereby causing the mechanical plug to move upwards in the nozzle and to rupture rupturable seal 44. The mechanical plug moves in a groove in the outlet nozzle 42 (not shown). Accordingly, as shown in Figure 5B there is no longer any obstruction between the outlet nozzle and the remainder of the beverage package. Thus, when a beverage is prepared it can flow via the bore 52 of mechanical plug 47 through outlet aperture 42 into a cup or other receptacle positioned below platen 49.

Although the present invention has been described with specific reference to the preparation of beverages from powdered beverage preparation ingredients, it is to be understood that the invention is not limited to packages containing only powdered beverage ingredients, but also includes within its scope packages containing other powder, paste or liquid comestibles.

Claims

1. A sealed package containing one or more powder, paste or liquid comestible preparation ingredients and being formed from substantially air- and water-impermeable materials, the said package comprising a compartment containing the said one or more comestible preparation ingredients, an inlet which communicates with the said compartment and an outlet which communicates with the said compartment the package being provided with control means to prevent the ingress of the powder, paste or liquid ingredient or ingredients into the outlet from the compartment containing the ingredients prior to the preparation of a comestible from the said ingredients.

2. A package as claimed in claim 1 wherein the outlet is covered by a substantially air- and water-impermeable material prior to the formation, in use, of an outlet in the package.

3. A package as claimed in claim 1 wherein the outlet is closed by a plug prior to the formation, in use, of an outlet in the package.

4. A package as claimed in any one of the preceding claims wherein the control means comprises a flap positioned between the compartment and the outlet, which flap remains closed under the weight of the ingredient or ingredients, but which is adapted, in use, to deform under the pressure of the comestible formed from the ingredient(s) and thus to allow the comestible to flow therethrough.

5. A package as claimed in any one of claims 1 to 3, wherein the control means comprises a slit deformable material positioned between the compartment and the outlet, which material does not deform under the weight of the ingredient or ingredients, but which is adapted, in use, to deform under the pressure of the comestible formed from the ingredient(s) and thus to allow the comestible to flow therethrough.

6. A package as claimed in any one of claims 1 to 3 wherein the control means comprises a seal positioned between the compartment and the outlet, which is ruptured by the pressure and/or temperature of the comestible formed from the ingredient(s) and thus allows the comestible to flow therethrough.

7. A package as claimed in any one of claims 1 to 3 wherein the control means comprises a water soluble plug of a harmless material positioned between the compartment and the outlet, the plug dissolving when the comestible formed from the ingredient(s) comes into contact therewith.

8. A package as claimed in any one of claims 1 to 3 wherein the control means comprises a mechanical plug positioned within the outlet, the plug being adapted to move from a position in which it closes the outlet nozzle to a position in which the outlet nozzle is opened.

9. A package as claimed in any one of the preceding claims wherein the powder, paste or liquid ingredient or ingredients are beverage preparation ingredients.

10. A package as claimed in any one of the preceding claims which is provided with a recognition means whereby, in use, the package is identified by the machine into which it is placed for treatment therefrom and the identification of the package thereby causes it to be subjected to the correct treatment steps including the introduction of a fluid medium into the package.

11. A package as claimed in claim 10 wherein the recognition means comprises one or more surface features formed in the body of the package.

12. A package as claimed in claim 10 wherein the recognition means comprises a bar code.

13. A package as claimed in claim 10 wherein the recognition means comprises a pattern of holes formed in the body of the package.

14. A package as claimed in claim 10 wherein the recognition means comprises a pattern of contrasting tones or colours.

15. A package as claimed in claim 10 wherein the recognition means comprises one or more strips of a magnetic material.

16. A package as claimed in claim 10 wherein the recognition means comprises an inductive device.

17. A package as claimed in claim 10 wherein the recognition means comprises a plurality of electrically conductive means.

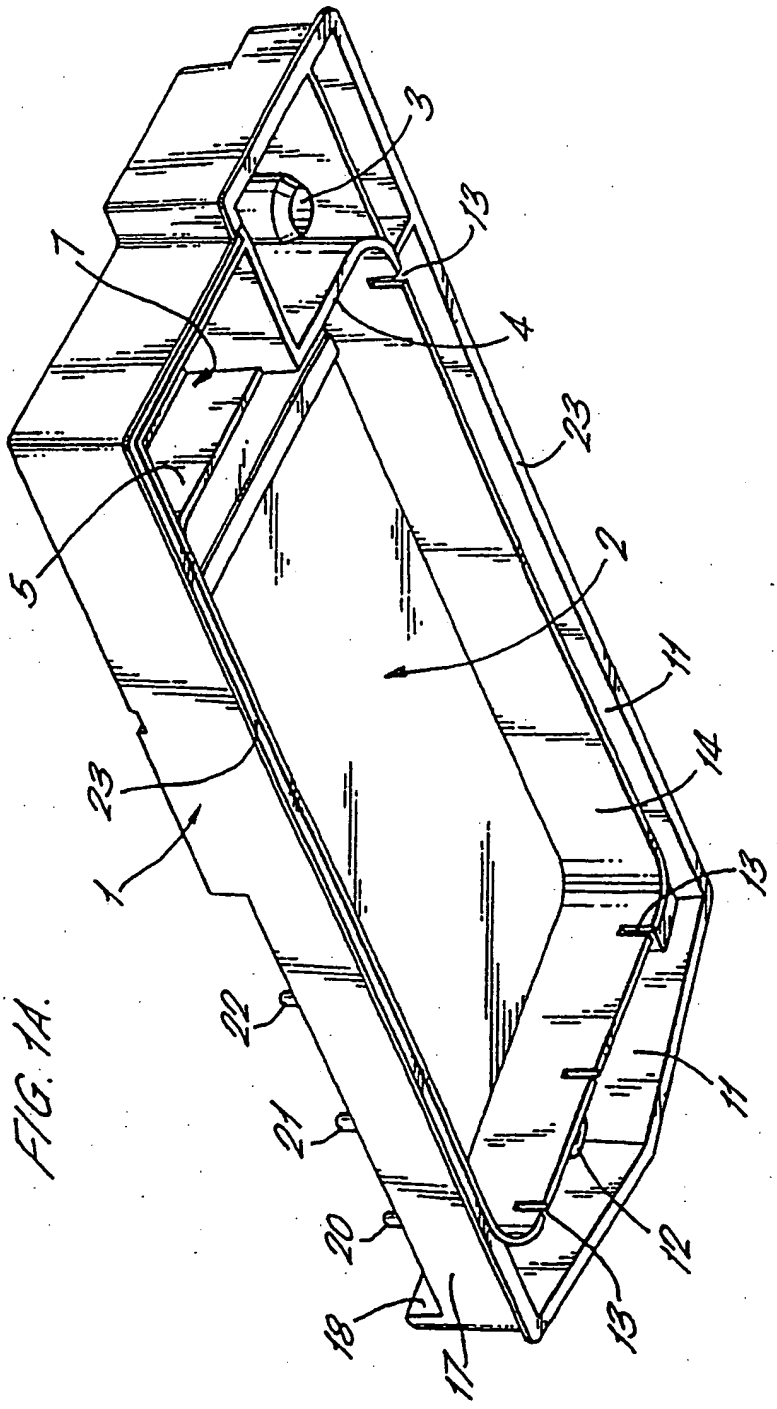

FIG. 1A.

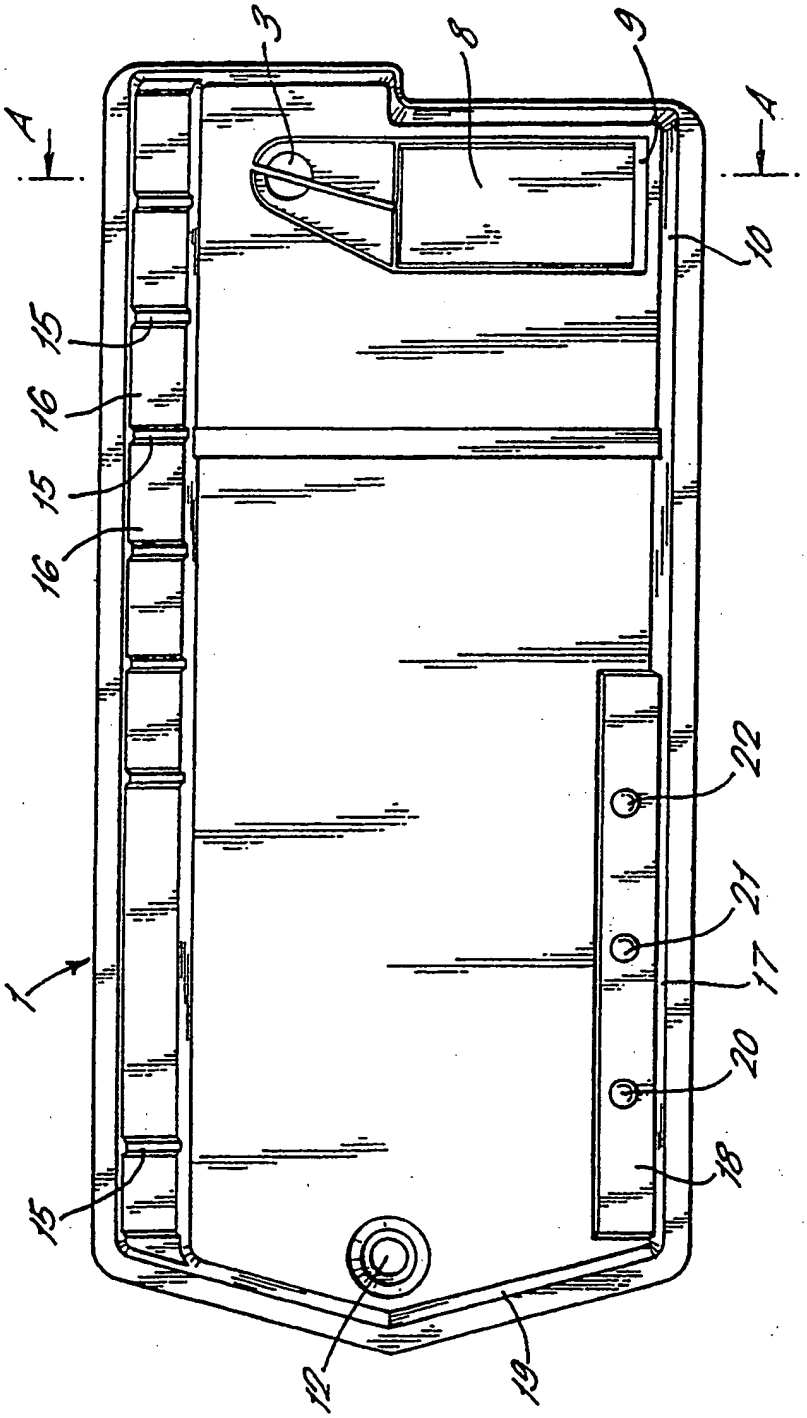

FIG. 1B.

FIG. 1C.

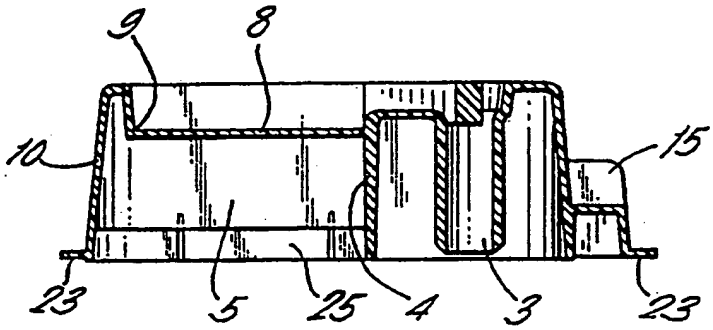

FIG. 1D.

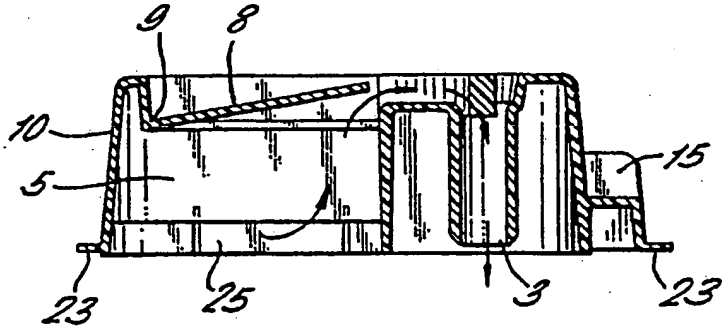

FIG. 2.

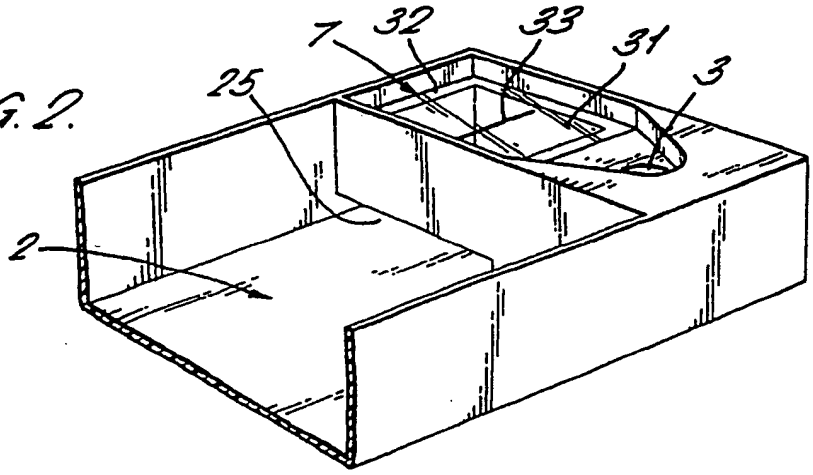

FIG. 3.

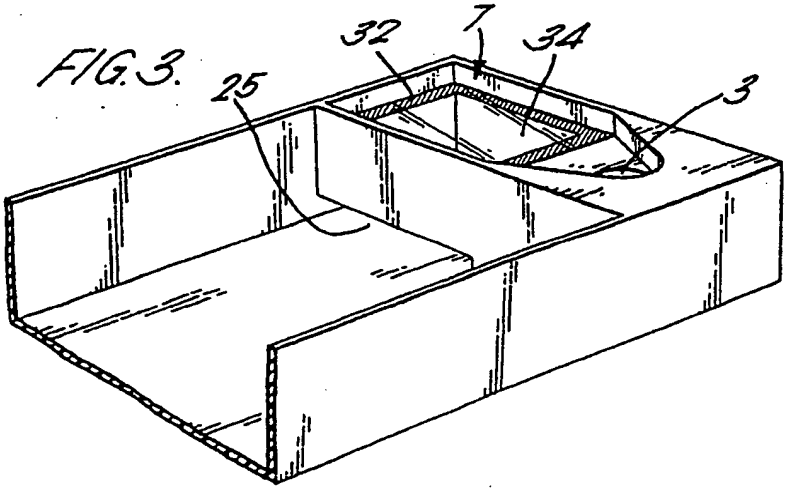

FIG. 4.

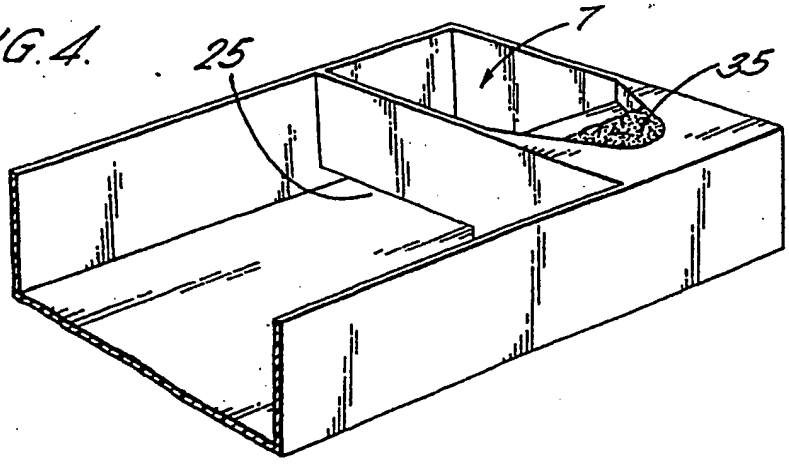

FIG. 5A.

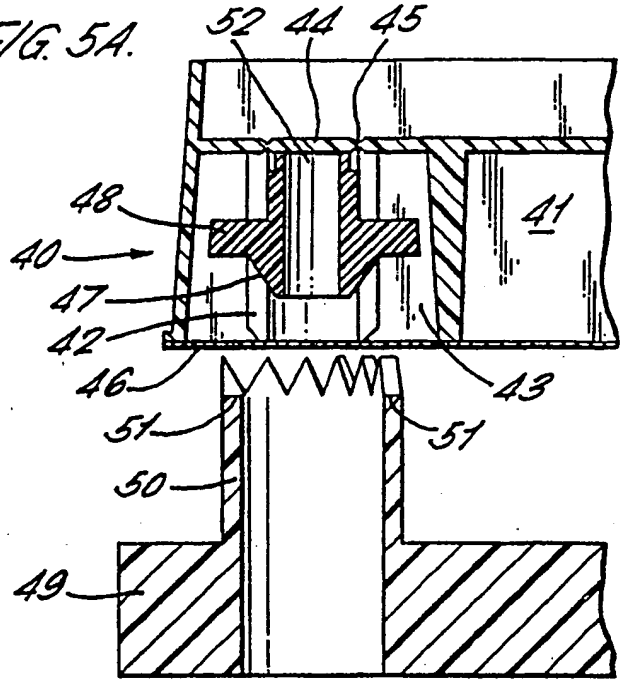

FIG. 5B.